NRCS
Natural Resources
Conservation Service

United States Department of Agriculture
Natural Resources Conservation Service

Fact Sheet--
Air Quality and Atmospheric Change

Air Quality and Atmospheric Change National Technology Development Team

Air Quality and Livestock Operations

Overview

Animal operations, particularly concentrated operations, are currently the main focus when considering air quality issues in agriculture. In order to assist animal producers in their conservation efforts to improve and protect the natural resources, NRCS is placing increased importance on air quality and atmospheric change. In fact, Clean Air has been included as a Venture Goal in the NRCS Strategic Plan 2005-2010. As a relatively new field of focus within the agency, NRCS guidance and conservation practice standards for addressing air resource issues are under development.

As NRCS moves to include air quality and atmospheric change in its conservation planning efforts with farmers and ranchers on private lands, we are currently focused on four main components of the air resource --Particulate Matter, Ozone Precursors, Greenhouse Gases, and Odors.

Particulate Matter (PM)

PM can be emitted directly (i.e., dust) or formed in the atmosphere by the chemical reaction of pollutants such as sulfur oxides (SOx), nitrogen oxides (NOx), volatile organic compounds (VOCs), and ammonia. Animal operations can influence PM in a variety of ways.

- Animal activity can produce dust emissions which can be carried by wind or building ventilation.
- Storage, handling, and the breakdown or decomposition of feed, bedding material, and manure can produce dust emissions as well as the emission of VOCs, ammonia, and NOx.
- Fuel combustion, or the burning of biological material, can produce fine PM as well as NOx and VOCs.
- Manure decomposition and its application on the land can produce emissions of VOCs, ammonia, and NOx.

Odors

While some odorous compounds can cause health problems, odors from livestock are mainly a community or individual perception issue. Many different compounds can be the potential cause of odors from agricultural operations. These compounds can generally be classified as VOCs, odorous sulfur compounds, or ammonia. Odors may arise from animal operations in a number of ways, including:

- All living organisms (including animals) emit VOCs (including odorous compounds) naturally.
- The breakdown or decomposition of biological materials such as manure or feed can produce odorous compounds, including VOCs, odorous sulfur compounds, and ammonia.

Ozone Precursors

VOCs and NOx are also precursors to ozone, meaning they are pollutants from which ozone is formed. Some ways that animal operations can impact VOC and NOx formation are:

VOCs

- All living organisms (including animals) emit VOCs naturally.
- The breakdown or decomposition of biological materials such as manure or feed can produce VOCs.
- Incomplete fuel combustion or the burning of biological material can produce VOCs.

NOx

- Fuel combustion or the burning of biological material can produce NOx.
- The breakdown or decomposition (mainly nitrification/denitrification) of biological materials such as manure or feed can lead to NOx formation.

Greenhouse Gases (GHGs)

The major greenhouse gases associated with agricultural operations are carbon dioxide, methane, and nitrous oxide. Common processes in animal operations that may produce GHGs are:

- Animals emit carbon dioxide and methane naturally. Ruminants, such as cattle, generally emit larger amounts of methane than non-ruminants.
- The breakdown or decomposition of biological materials such as manure or feed can produce GHGs; including carbon dioxide, methane, and nitrous oxide.

For More Information

NRCS is currently developing guidance and conservation practice standards to address air resource issues for animal operations. For more information, contact the Air Quality and Atmospheric Change National Technology Development Team (http://www.airquality.nrcs.usda.gov/) at the West National Technology Support Center in Portland, Oregon. (Primary contact: Greg Zwicke, 503-273-2434, greg.zwicke@por.usda.gov).

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